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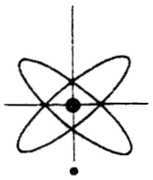

COMPUTER SCIENCES CORPORATION

FINAL REPORT

CONTRACT NAS 9-3710

INFORMATION RETRIEVAL AND ENGINEERING AIDS SYSTEM

July 15, 1966

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I. INTRODUCTION

Computer Sciences Corporation is pleased to submit this final report as specified under Item (B) Article VIII of Contract Number NAS 9-3710 and in fulfillment of the requirements under Paragraph (C) and (D,4) of the "New Technology" clause.

This report documents and summarizes the results of the entire contract work. It is in sufficient detail to comprehensively explain the results achieved under the contract.

II. NEGOTIATED CONTRACT NAS 9-3710 DATED NOVEMBER 27, 1964

A. STATEMENT OF WORK

The statement of work in contract NAS 9-3710 commissioned Computer Sciences Corporation to develop for the computation and Data Reduction Division, Manned Spacecraft Center, NASA, an Information Retrieval and Engineering Aids System in accordance with Computer Sciences Corporation's proposal dated September 30, 1964.

B. DEFINITION

The IR and EA System was designed to process, catalog, edit and report the immense volumes of engineering data generated in the development and construction of Manned Spacecraft Systems for the Apollo Spacecraft Program.

The data involved includes complete descriptive information of development, test, and flight models, as well as ground support equipment. Descriptions of the construction and test specifications and the bill of material or engineering parts list. The information is maintained in such a manner that both the parts list and the Where-Used data may be retrieved for any assembly report. In addition to the descriptive information, the files contain data on test and qualification status, design configuration, as-built configuration, failure, documentation, control indexes, engineering orders and completions, reliability, and contractor and manufacturer identification.

C. REPORTABLE ITEMS

The IR and EA System consists of four (4) major computer programs or phases:

1. Input Processor Computer Program
2. Master File Update Computer Program
3. Generation Breakdown Computer Program
4. Report Generator Computer Program

1. REPORTABLE ITEM NUMBER 1 - INPUT PROCESSOR COMPUTER PROGRAM

The Input Processor Computer Program is referred to as "VARP" i,e, Validating and Reformatting Program. Its function is threefold.

1. Edit and verify all input system data as received from the prime contractors via magnetic tape files.
2. Allow for the correction of all involved data to produce corrected and validated magnetic tape files for additional processing by the IR and EA System.
3. Provide that "Sorting" capability whereby the input data can be arranged in the proper data sequence for additional processing by the IR and EA System.

This computer program was completely documented and delivered to the Computation and Data Reduction Division, Manned Spacecraft Center, NASA, in IR and EA Documents Numbers (8) amd (9) dated February 22, 1966.

2. REPORTABLE ITEM NUMBER 2 - MASTER FILE UPDATE COMPUTER PROGRAM

The Master File Update Computer Program is referred to as "MFUP" i,e, Master File Update Program. Its function is to update all master files in the IR and EA System. Updating is accomplished by means of a merge of the update Files with the existing Master Files.

The following Master Files are updated by means of the Master File Updating Program:

1. Engineering Parts Master File
2. Where-Used Master File
3. Documentation Master File
4. Engineering Order Master File
5. Configuration and Traceability Master File

This Computer Program was completely documented and delivered to the Computation and Data Reduction Division, Manned Spacecraft Center, NASA, in IR and EA Documentation Number Ten (10) dated February 1, 1966.

3. REPORTABLE ITEM NUMBER 3 - GENERATION BREAKDOWN COMPUTER PROGRAM

The Generation Breakdown Computer Program is referred to as "GB" i,e, Generation Breakdown. The purpose of the Generation Breakdown is to produce "Indentured Parts Listing" for a particular Spacecraft Module or Effectivity. Included in this program is the computer program designed to provide a comparison of the Designs Configurations vs. the As-Built Configuration for a particular Spacecraft Module or Effectivity.

The Generation Breakdown Computer Program consists of eight (8) sub-programs:

1. GB I

   This phase extracts certain data records from either the Engineering Parts File or the Configuration and Traceability File for the production of an Indentured Parts Listing.

   Included in this sub-phase is the program to produce a comparison of the Design Configuration vs. the As-Built Configuration for a particular Spacecraft Module or Effectivity.

2. GB II

   This sub-phase consists of a Sort of the extracted data from GB I to provide input to the next sub-phase.

3. GB III

   This sub-phase consists of a Sort of the extracted data from GB I to provide input to the next sub-phase in that the "sort-sequence" of the output data is different.

4. GB IV

   This sub-phase provides an "Inconsistency Check" of the extracted data to insure that the proper logical relationship exists in the data for further processing by the IR and EA System.

5. GB V

   GB V is a sub-phase consisting of a Sort which arranges the data in the proper data-sequence for processing in the next sub-phase.

6. GB VI

   This sub-phase performs the task of actually creating a logical relationship between the data records for the production of an Indentured Parts Listing.

GB VII

GB VII consists of a Sort of the output data from the preceeding sub-phase in order to arrange the data in the proper sequence for the reduction of the Indentured Parts Listing to hard copy.

GB VIII

GB VIII consists of a print program to actually reduce the Indentured Parts Listing produced by preceeding phases to hard copy.

The computer was completely documented and delivered to the Computation and Data Reduction Division, Manned Spacecraft Center, NASA, in IR and EA Document Number (12) dated February 28, 1966.

4. REPORTABLE ITEM NUMBER 4 - REPORT GENERATOR COMPUTER PROGRAM

The Report Generator computer Program is referred to as "RGP", i,e, Report Generator Program. This computer program performs the task for reducing specified user reports to hard copy.

This computer program was completely documented and delivered to the Computation and Data Reduction Division, Manned Spacecraft Center, NASA, in IR and EA System Document Number (11) dated February 1, 1966.

5. REPORTABLE ITEM NUMBER 5 - IR AND EA SYSTEM CODE TABLE PROGRAM

The purpose of the IR and EA System Code Table Program is to create on magnetic tape, those special tables required by the computer programs in the IR and EA System to properly process all input data.

This computer program was completely documented and delivered to the Computation and Data Reduction Division, Manned Spacecraft Center, NASA, in IR and EA System Document Number (13) dated December 31, 1965.

6. REPORTABLE ITEM NUMBER 6 - OPERATING PROCEDURES FOR THE IR AND EA SYSTEM

The specifications contained in the Operating Procedures Manual for the IR and EA System completely describes the operating procedures applicable to regular production processing for the Information Retrieval and Engineering Aids System.

Each section of the manual contains specific instructions on program control card requirements and usage, input and output tape files and their respective unit assignments, and all possible program produced messages for all computer programs or sort phases in the IR and EA System computer programs.

This set of operating procedures was delivered to the Computation and Data Reduction Division, Manned Spacecraft Center, NASA, in IR and EA System Document Number (14) dated February 22, 1966.

III. CHANGE ORDER MODIFICATION NUMBER (1) DATED FEBRUARY 24, 1965.

A. GENERAL

Change Order Modification Number one (1) dated February 24, 1965 Amended Contract Number NAS 9-3710 to include additional computer programming to provide for the computation Analysis and Data Reduction Division, Manned Spacecraft Center, NASA an Information System in the area of Qualification Status Data.

B. STATEMENT OF WORK - CHANGE ORDER MODIFICATION NUMBER (1)

The Contractor shall provide:

1. The contractor is directed to immediately implement the Qualification Status Information System, a subsystem of the IR and EA System, in order to prepare Qualification Status reports on or before February 15, 1965.
2. All source data will be supplied as documents, punched cards or magnetic tape.

C. REPORTABLE ITEMS

The reportable item under Change Order Modification Number One (1) constituted a computer retrieval program to correlate and process Qualification Status Data and prepare the necessary user reports.

1. REPORTABLE ITEM NUMBER 7 - QUALIFICATION STATUS DATA INFORMATION SYSTEM

The Qualification Status Data Information System was designed, implemented and delivered to the computation and Analysis Division, Manned Spacecraft Center, NASA, including complete documentation.

Documentation included flowcharts, source program card decks, and binary decks. This documentation was delivered in March 1965.

IV. CHANGE ORDER NUMBER (2) DATED JUNE 26, 1965 CONTRACT NAS 9-3710

A. General

Change Order Modification Number (2) dated June 26, 1966, amended contract NAS 9-3710 to include additional computer programming in five (5) areas. However, Supplemental Agreement, Modification Number (3) dated November 18, 1965 amended Change Order Modification Number (2) to delete three (3) of the five (5) additional requirements.

B. Statement of Work - Change Order Modification Number (3)

The Contractor Shall Provide:

1. File Maintenance, retrieval, and report generator programs for a Ground Support Equipment status and responsibility control system, and a checkout Data Documentation System.

2. Retrieval system for Reliability and Quality Assurance data in the area of parts and materials. This task involves correlating the parts and materials data system with the present IR and EA System.

C. Two reportable items were contained within the scope of change Order Modification Number Two (2). These reportable items are described as follows.

1. REPORTABLE ITEM NUMBER 8 - GROUND SUPPORT EQUIPMENT SYSTEM

as described in paragraph (II,B,1.) and defined in Change Order Modification Number (2) dated June 26, 1965.

The Ground Support Equipment System (GSE) was developed by Computer Sciences Corporation in conjunction with the design efforts of General Electric Corporation. The purpose of the GSE System was to gather and combine data from two Apollo prime contractors and produce a centralized master date bank from which numerous reports could be retrieved.

The GSE computer system consisted of six (6) computer programs.

On May 31, 1966, the Computer programs comprising the Ground Support Equipment Systesm were delivered to Lockheed Electronics Company under contract number NAS 9-5384, Lockheed Electronics Company became responsible contractor for the completion of the GSE System. Therefore, the completed GSE System was delivered to Lockheed Electronics Company rather than Computations and Analysis Division, Manned Spacecraft Center, NASA.

2. REPORTABLE ITEM NUMBER 9 - RETRIEVAL SYSTEM FOR RELIABILITY AND QUALITY ASSURANCE DATA IN THE AREA OF PARTS AND MATERIALS.

The primary objective of the system was to create a Parts and Materials System for the effective retrieval of Reliability and Quality Assurance data, and the correlation with the information available in the present Information Retrieval and Engineering Aids System.

The Analysis was performed in response to Change Order Modification Number two (2), to contract NAS 9-3710, Addition A to Paragraph 3.5 of CSC Work Statement.

The final study report for the analysis fo the "Engineering and Configuration Management Reporting System (EMCR) was delivered to the computation and Analysis Division, Manned Spacecraft Center, NASA, in November 1965.

V. SUBCONTRACTS

In accordance with paragraph (d) (14) of contract NAS 9-3710, Computer Sciences Corporation certifies that no such subcontracts were awarded.

VI. SUMMARY OF REVIEW ACTIVITIES UNDERTAKEN FOR THE PURPOSE OF IDENTIFYING REPORTABLE ITEMS.

As required by the terms of Contract NAS 9-3710, Computer Sciences Corporation submitted to the NASA technical monitor for contract NAS 9-3710, a monthly report covering the progress of the project, problem areas encountered and proposed schedule of work for each following month. The monthly reports submitted contain a complete review of all reportable items including delivery dates of each reportable item. These monthly reports were submitted for the months of November through December, 1965; and January through February, 1966.